ABSTRACT OF THE DISCLOSURE

A Seebeck effect thermal sensor is formed in an integrated fashion with a power-dissipating device such as a power MOSFET. The integrated device generates a temperature difference between a relatively cold peripheral area and a relatively warm central area, the temperature difference having a known relationship to electrical operating conditions of the device. A structure for a power MOSFET includes two side-by-side arrays of source/drain diffusions. The Seebeck sensor has warm junctions at the central area and cold junctions at the peripheral area, and generates an electrical output signal having a known relationship to the temperature difference between the peripheral and central areas to provide an indication of the electrical operating conditions of the device. One Seebeck sensor includes alternating metal and polysilicon traces, wherein the polysilicon traces lie between source and drain diffusions of a power MOSFET just as do active polysilicon gates. Multiple pairs of conductors can be placed in series to obtain a higher-gain Seebeck sensor.

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